بسم الله الرحمن الرحيم

Odontogenic Infections

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Outline

- ❖ Microbiology of Infection
- ❖ Pathway of Infection
- ❖ Stages & Spread of Infection

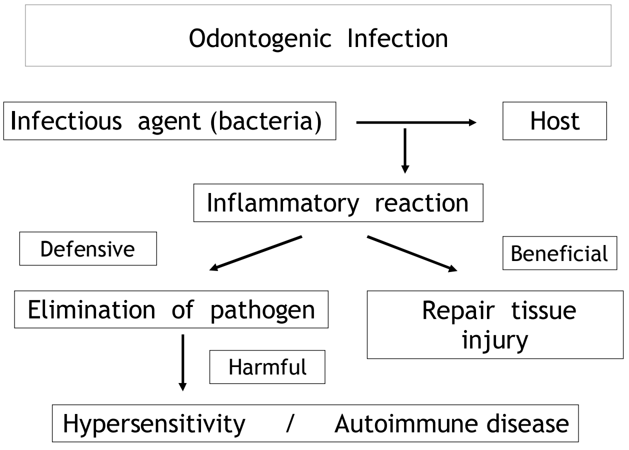
Learning Objectives

- Diagnose: Presence of Odontogenic Infection
- Understand: Nature & Pathway of Odontogenic Infection
- Learn: Methods of treatment & prevention of Infection

Odontogenic Infection

Infection means invasion of body by pathogenic microorganisms.

Inflammation or inflammatory response is reaction of tissues to these microorganisms as well as to the toxins generated by them, aiming at eliminating the irritant & restoring normality.



Odontogenic Infection

Infectious agent (bacteria)

Host

Inflammatory reaction

Defensive

Beneficial

Elimination of pathogen

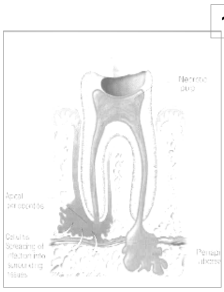
Repair tissue injury

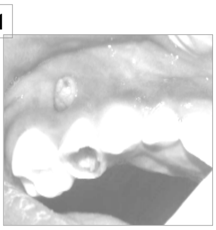
Harmful

Hypersensitivity / Autoimmune disease

How does Odontogenic Infection Develops ?
Etiology or Causes

1



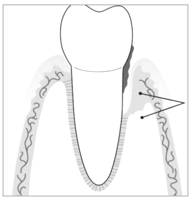


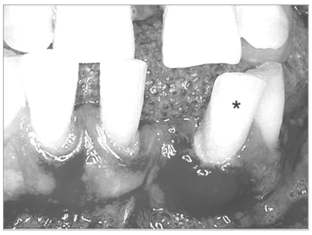
Pulpitis , Pulp necrosis & Periapical Abscess

2 Remaining Roots

How does Odontogenic Infection Develops ?

3

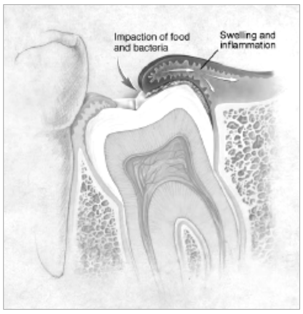


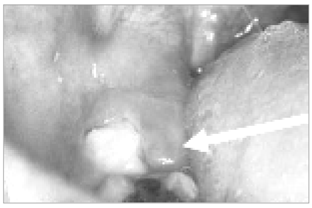


Periodontitis & Periodontal Abscess

How does Odontogenic Infection Develops ?

4

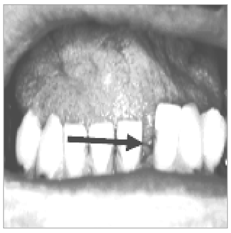




Pericoronitis

How does Odontogenic Infection Develops ?

5 Trauma



6 Thermal & Chemical Injury

Compound Jaw Fractures

How does Odontogenic Infection Develops ?

6 Maxillary sinus infection

7 Adenogenous infection

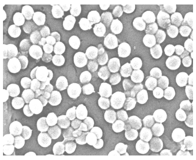
8 Iatrogenic infection

9 Post-surgical infection

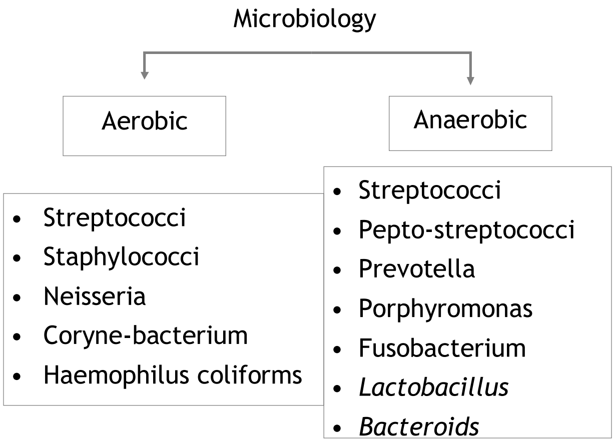
10 Infected Odontogenic cyst

11 Hematogenous

Microbiology



- ❖ More than 400 species part of normal oral flora
- ❖ Anaerobes > than Aerobes
- ❖ Aerobes only 6 %
- ❖ Anaerobes only 50 %
- ❖ Mixed Aerobes & Anaerobes 44 %
- ❖ Fungi & Spirochetes



Microbiology

Aerobic

- Streptococci
- Staphylococci
- Neisseria
- Coryne-bacterium
- Haemophilus coliforms

Anaerobic

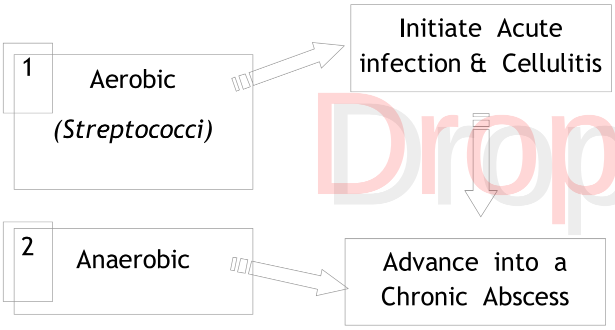
- Streptococci
- Pepto-streptococci
- Prevotella
- Porphyromonas
- Fusobacterium
- *Lactobacillus*
- *Bacteroids*

Pathogenesis/ Pathophysiology

Anaerobic microorg. Inhibit Phagocytosis of Aerobic microorg.

Aerobic microorg. Consume Oxygen thus supporting growth of Anaerobic microorg.

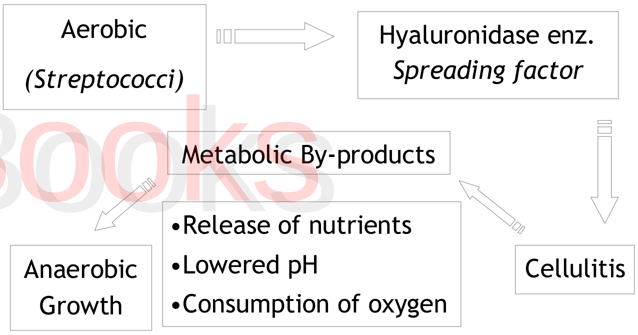
Pathogenesis / Pathophysiology



1 Aerobic *(Streptococci)* → Initiate Acute infection & Cellulitis

2 Anaerobic → Advance into a Chronic Abscess

Pathogenesis / Pathophysiology



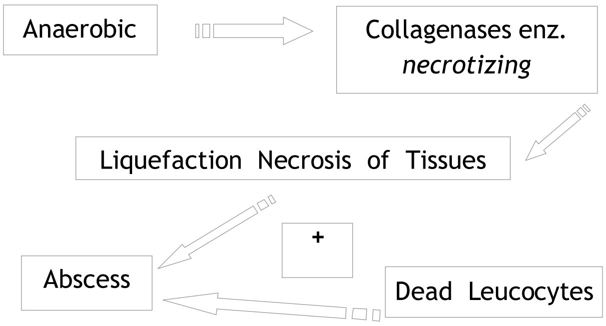
Aerobic *(Streptococci)* → Hyaluronidase enz. *Spreading factor* → Cellulitis

Metabolic By-products

- Release of nutrients
- Lowered pH
- Consumption of oxygen

Anaerobic Growth

Pathogenesis / Pathophysiology



Anaerobic → Collagenases enz. *necrotizing* → Liquefaction Necrosis of Tissues → Abscess

+

Dead Leucocytes → Abscess

Pathogenesis / Pathophysiology

Acute

Chronic

$$\text{Severity or Degree of infection} \approx \frac{\text{Virulence of microorganism} \times \text{No. of microorganisms}}{\text{Host Resistance}}$$

Pathogenesis

Virulence means all the characteristics of microorganism that are injurious to the host.

Virulence of micorg.

- Mode of growth
- Enzymes
- Chemotaxis
- Toxins

Mode of Growth

- Staphylococci grow in colonies helping localization
- Streptococci grow in chains helping spread

Enzymes

- Staphylococci release coagulase enzyme, helping fibrin formation & localization of infection with abscess formation.
- Streptococci release Fibrinolysin helping dissolution of fibrin, & Hyaluronidase enzyme increasing tissue permeability, both enzymes help spread.

Chemotaxis

- Ability of microorg. to attract polymorphonuclear leucocytes. Staphylococci more chemotactic than streptococci so the later help spread.

Pathogenesis

Host Defenses

Biochemical environment, integrity of tissues, & Immune system of patient suggesting either Susceptibility or Resistance.

- Cellular defense
- Humoral defense

Humoral defense

- Antibodies production
- Antigen / Antibody reaction
- Complement activation
- Host recognition of invaders

Enhance Phagocytosis

Cellular defense

- Capillary dilatation, extravasations, & edema
- Lymphatic blockage
- Chemotaxis
- Phagocytosis
- Leucocytes lyses by cellular proteases
- Mononuclear macrophages scavenging debris

Patients @ Risk

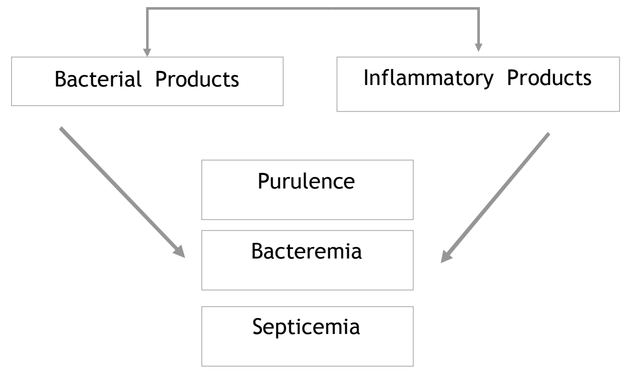
Predisposing Factors

Immuno-compromised Patients

Uncontrolled Metabolic Diseases :
- Diabetes
- End-stage renal diseases
- Alcoholism
- Malnutrition

Immuno-suppressive Diseases :
- Lymphoma , Leukemia , Anemia
- Congenital & Acquired immuno-compromising diseases

Immuno-suppressive Therapies :
- Cancer Chemotherapy
- Radiotherapy
- Corticosteroids
- Drugs used in Organ Transplant



Products of Infection

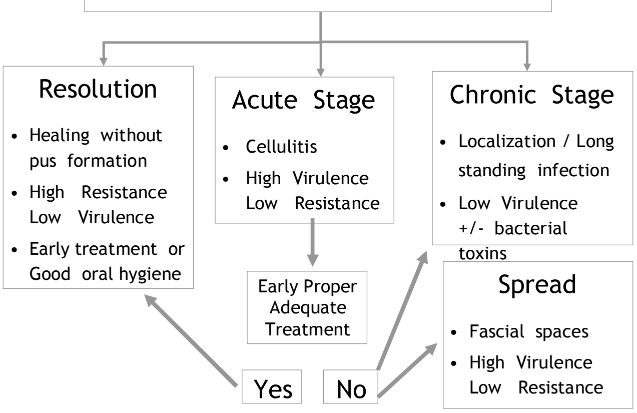
Bacterial Products

Inflammatory Products

Purulence

Bacteremia

Septicemia



Fate & Phases of Infection

Resolution
- Healing without pus formation
- High Resistance Low Virulence
- Early treatment or Good oral hygiene

Acute Stage
- Cellulitis
- High Virulence Low Resistance

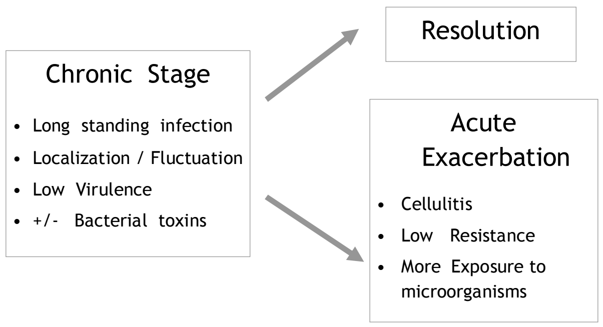
Early Proper Adequate Treatment

Yes

No

Chronic Stage
- Localization / Long standing infection
- Low Virulence +/- bacterial toxins

Spread
- Fascial spaces
- High Virulence Low Resistance



Fate & Phases of Infection

Chronic Stage
- Long standing infection
- Localization / Fluctuation
- Low Virulence
- +/- Bacterial toxins

Resolution

Acute Exacerbation
- Cellulitis
- Low Resistance
- More Exposure to microorganisms

Spread of Infection

Direct Continuity – Dento-alveolar Abscess

Through Lymphatics - LN

Blood Vessels - Veins – Septic Thrombosis

Spread of Infection

Direct Spread

Periapical / Dento-alveolar Abscess

↓

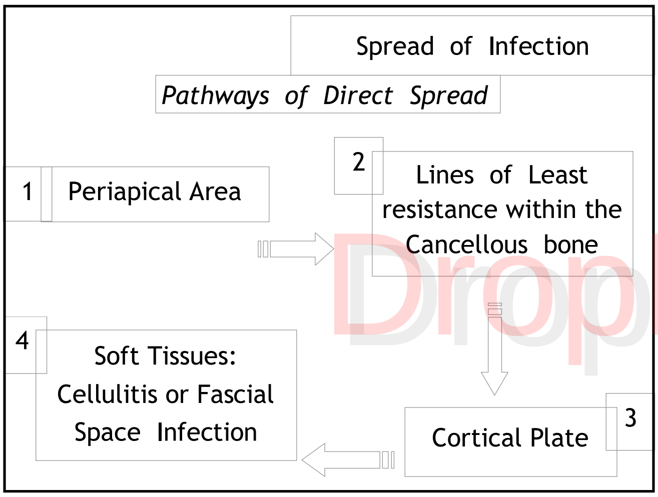
Vestibular / Fascial Space Abscess

↓

Serious Complications

Caries
↓
Pulpitis
↓
Apical infection

Alveolar bone
↓
Soft tissue
↓
Fascial space



Spread of Infection

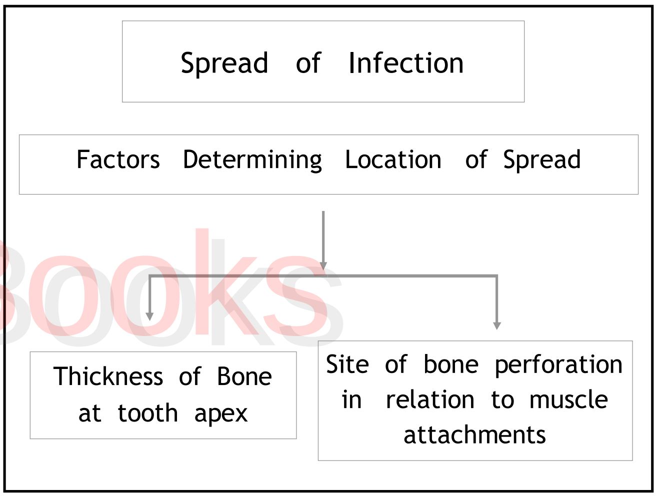
Pathways of Direct Spread

1 Periapical Area

2 Lines of Least resistance within the Cancellous bone

3 Cortical Plate

4 Soft Tissues: Cellulitis or Fascial Space Infection



Spread of Infection

Factors Determining Location of Spread

Thickness of Bone at tooth apex

Site of bone perforation in relation to muscle attachments

Spread of Infection

Thickness of Bone at tooth apex

Maxillary teeth	Mandibular teeth
Central, canine & buccal roots of premolars & molars are covered by very thin buccal bone. Lateral, & palatal roots of premolars & molars lie closer to palatal cortical plate.	Central, lateral, canine, premolars are covered by thin buccal bone. 1st & 2nd molars lie in center of alveolus. 3rd molar, lingual cortical plate is much more thinner than buccal cortical plate

Signs & Symptoms of Infection

Local	Systemic
1. Pain	1. Fever > 38 °c
2. Swelling	2. Pulse & Respiratory rt.↑
3. Hotness	3. Malaise / Lethargy
4. Redness	4. Lymphadenitis
5. Loss of Function	5. Leukocytosis

Signs & Symptoms of Infection

Three stages

Inoculation → Cellulitis → Abscess

Signs & Symptoms of Infection

Characteristics	Edema	Cellulitis	Abscess
1. Stage	Acute	Acute	Chronic
2. Duration	0-3 days	1-3 days	4-10 days
3. Pain	Mild	Diffuse	Localized
4. Size, borders	Variable	Diffuse	Circumscribed
5. Consistency	Soft	Firm / Hard	Fluctuant
6. Color	Normal	Red	Red- Shiny
7. Pus	Absent	Absent	Present
8. Bacteria	Aerobic	Mixed	Anaerobic

References

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